

80 MW Turbine-Generator **Journal-Thrust Bearing Upgrade**

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ABSTRACT

This case history discusses the upgrade of the #1 combination journal/thrust bearing assembly in an 80 MW turbine generator. The existing taper land thrust plates experienced frequent failures and the sleeve journal bearing was wearing prematurely.

A combination journal/thrust assembly was designed and installed in the turbine. This assembly incorporated a fully equalized ball & socket tilting pad thrust bearing with directed lubrication on the active side, the continued use of a taper land plate on the inactive side, and a ball & socket tilting pad journal bearing.

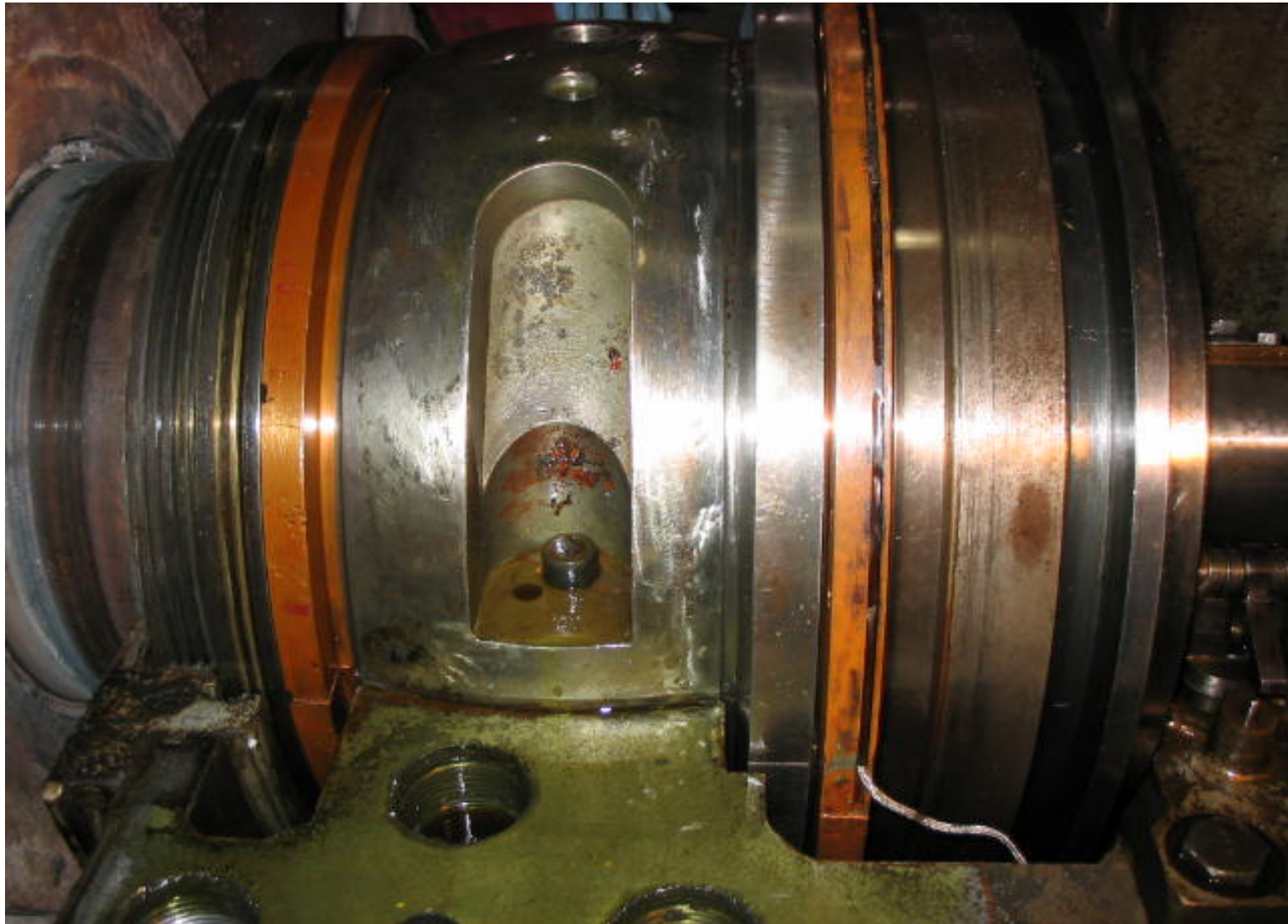
The Turbine-Generator Train



Bearing description:

The original bearing is a spherical fitted combination journal thrust, with taper plates for thrust bearings, and thin sleeve liner for journal bearing.

OEM bearing assembly



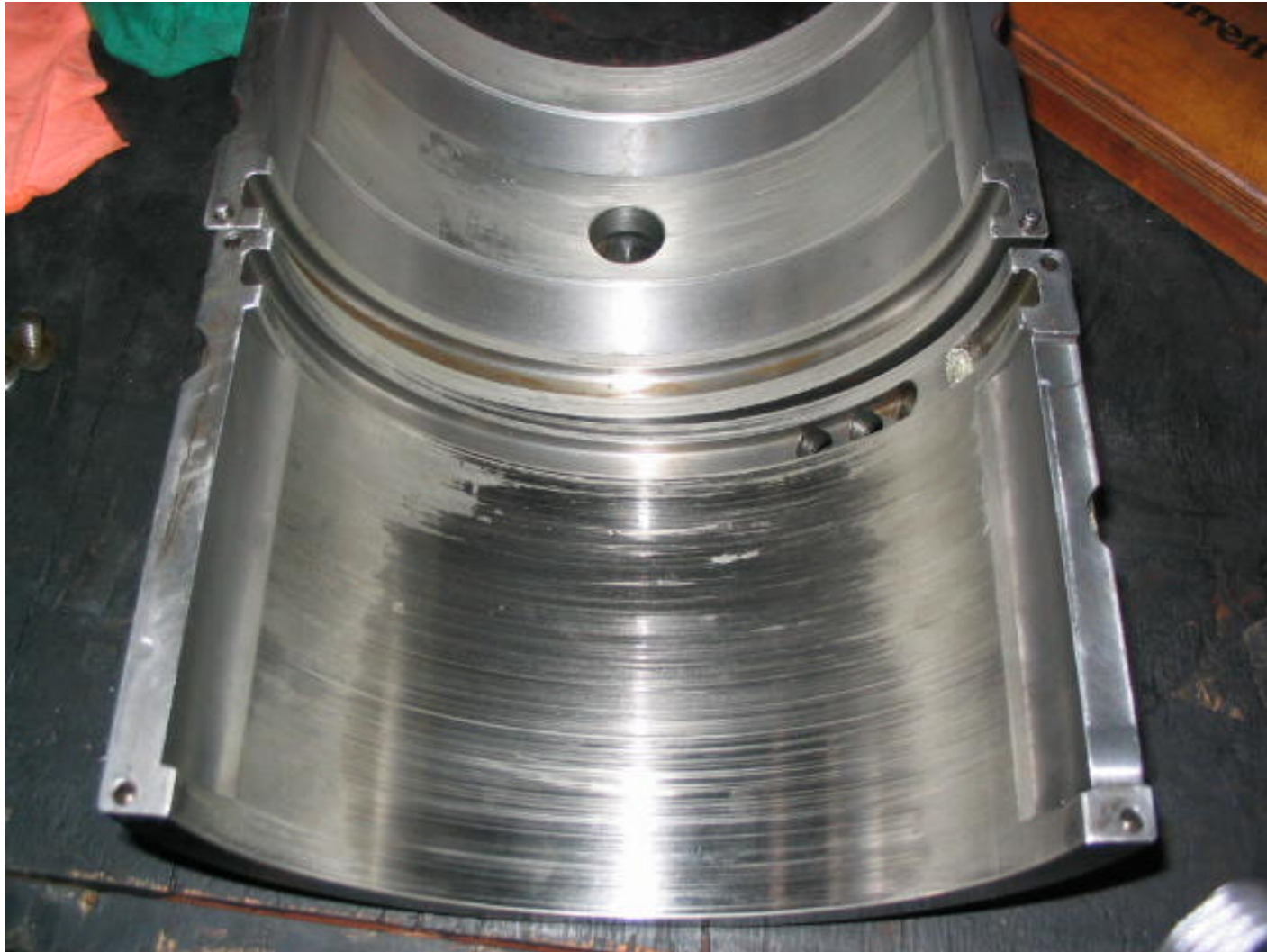
Problem:

The original bearings had no resistance to the stress and conditions in this machine. The loads, the misalignment, the large percentage of water in the oil are factors producing numerous failures of the thrust and journal bearings, which required maintenance shut-downs. These factors did not allow the machine to operate at full capacity.

Failed active thrust bearing



Wiping of Journal Bearing

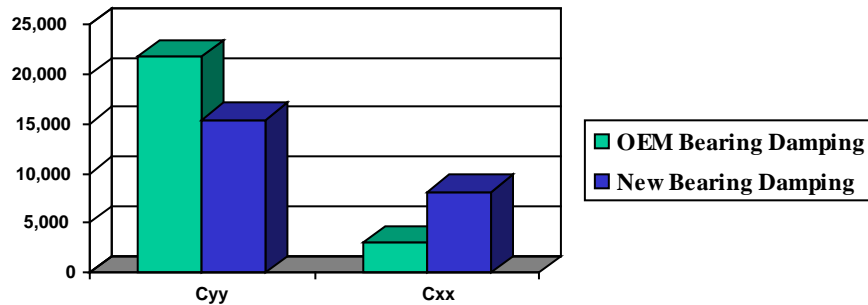
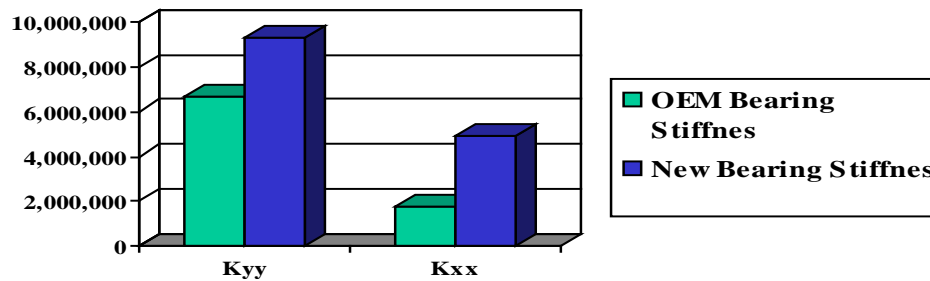


Solution:

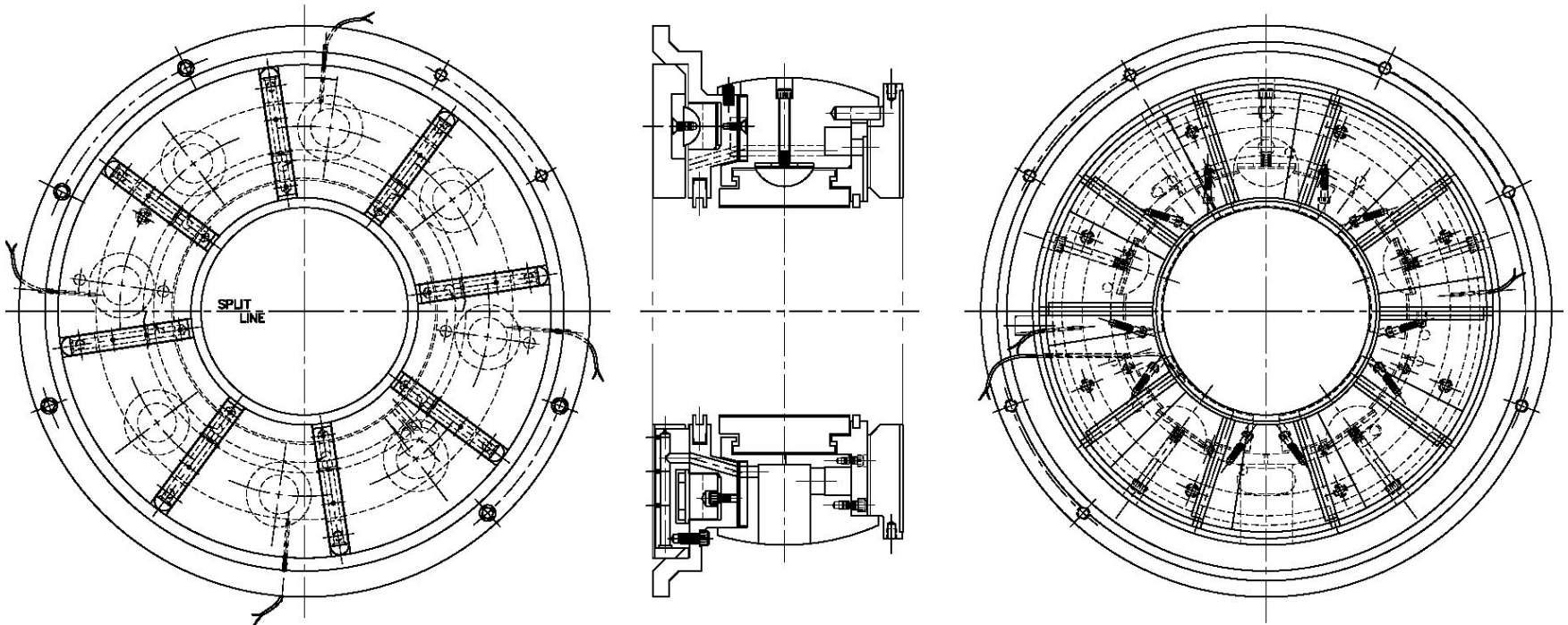
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The thrust pads are designed with 65% offset pivot in copper backed pads.

Stiffness & Damping Comparison



Upgraded Bearing Assembly

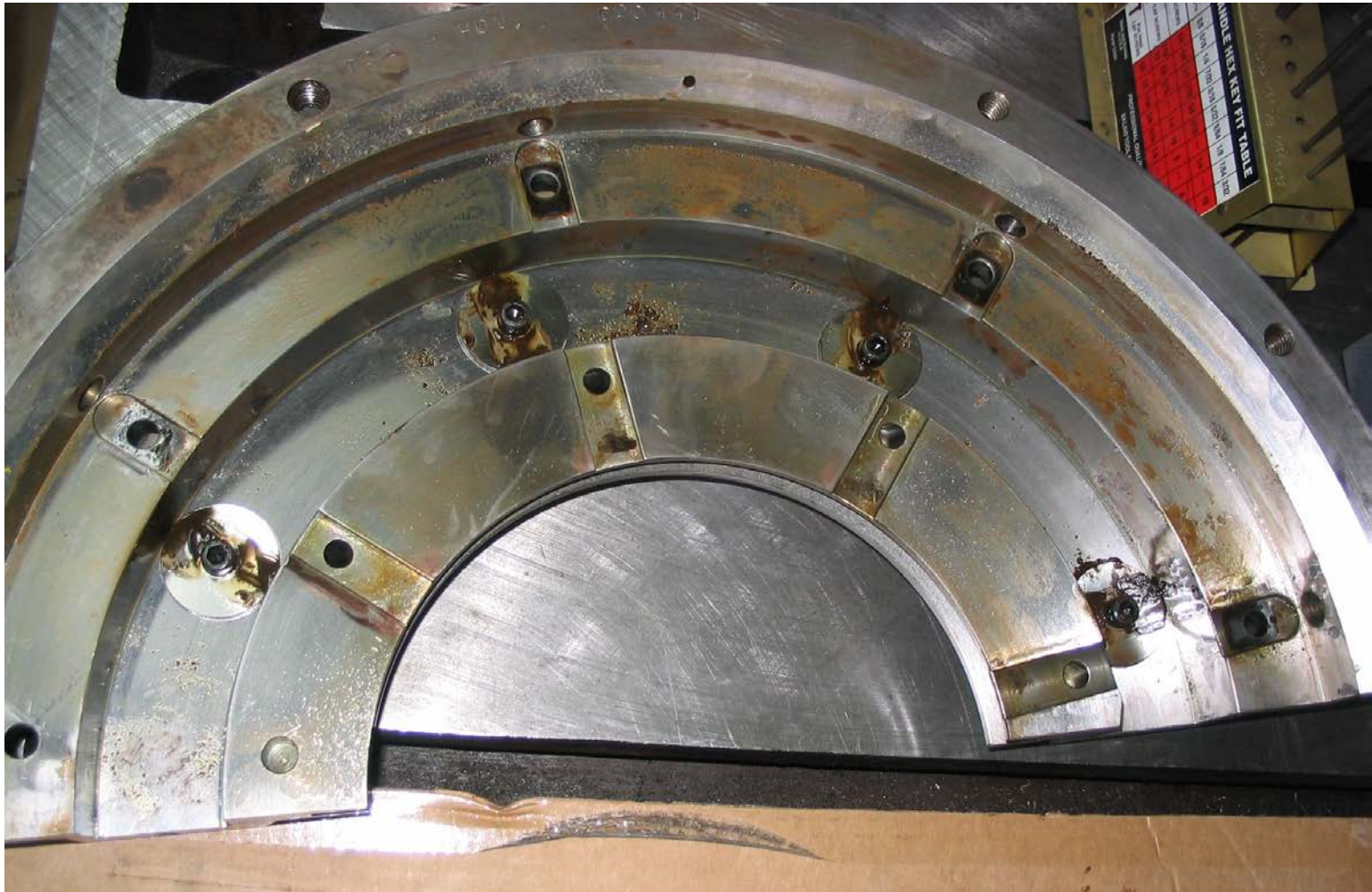


Photograph of upgraded Bearing Assembly



After one year in service, the customer had concerns about the percentage of water in the oil.

The bearing steel thrust bearing surfaces attacked by rust.



The thrust bearing has rusted surfaces in all steel parts.



After cleaning the rust, and light cleaning of the babbitt face, the bearing was installed without any repairs.



Conclusion:

The solution was implemented in unit #4 on January of 2003 and has run successfully with no high vibrations and no high metal temperatures. Same solution was implemented in the unit #3 in the summer of 2003. Both machines have run successfully since the upgrades. The percentage of water inside the oil remains the same.